Abstracts from the Fifth European Workshop on Astrobiology

EANA – European Astrobiology Network
Association 10–12 October 2005
Budapest, Hungary

Reactivation of possible dormant biology by the onset of convection in the ice shell of Europa

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Europa's chaos and lenticulae are frequently considered as being among the youngest geological features of Europa. These features may have been originated in relation to thermal diapirs linked to convective upwellings. Convection (and diapirism) starts if the ice shell is thicker than a critical value (with details depending on the dominant ice rheo-logy, grain size and intensity of tidal straining). Following to the onset of convection, isotherms in the stagnant lid (the thermally conductive, cold and essentially immobile lid above the actively convective layer) become shallower due to the higher convective heat flow, which should be additionally increased by tidal dissipation in the warm convective layer. Previously to the onset of convection, possible biological forms living in, or close to, the shell/ocean interphase could result trapped and dormant in ice, due to satellite cooling and thickening of the ice shell. Some biological substances are used to optimize cellular functioning under low water activity conditions, such as low-temperature and high-osmotic conditions. Trehalose is an example that is frequent in halo-philic microorganisms, which could be present on Europa. This kind of compound can reduce the water melting point to y230 K, a tempera-ture similar to that at the stagnant lid base. Thus, isotherms shallowing posterior to the onset of convection could cause an event of reacti-vation of dormant biological forms close to the base of the stagnant lid. The onset of thermal diapirism would have similar effects, moreover as diapirs are near to the melting temperature: chaos and lenticulae features are, therefore, places where signature of bio-antifreeze substances might be found.